REMARKS

1. **Introduction**

Reconsideration of this application is respectfully requested. The drawings have been amended to correct the informalities noted by the Official Draftsperson. The present claims are patentable over the cited art of record for at least the reasons set forth below. Accordingly, the application is believed to be in condition for allowance.

2. **The Present Claims are Patentable Over Mahdavieh et al., Which Fails to Teach or Suggest Identifying Theoretically-Similar Windows and Determining Defects According to Deviations from Expected Symmetry Properties as recited in the Claims.**

To anticipate a claim, a reference must teach every element of the claim: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). In the present case, the cited art, Mahdavieh et al., U.S. Patent 5,345,514, fails to meet these criteria.

Mahdavieh describes an inspection process in which areas of a device under test are scanned, and the results thereof are analyzed to determine whether or not defects in one of the scanned areas are present. The analysis occurs through several steps. First, of the three scans (each of which yields a two-dimensional gray scale image in which different pixels are assigned different gray scale intensities according to the scan results), a test image is selected. Using the test image and the other two "reference" images, so-called "result" images are produced. The result images are essentially normalized versions of the test image in which intensity variations due to differences in the actual device geometry have been removed. Mahdavieh at col. 3, l. 60 – col. 5, l. 27.

Thereafter, the two result images (after being filtered to remove noise) are converted from gray scale to binary through a thresholding process. The two binary images are then logically ANDed to create a composite binary image. Regions in this composite image in which there

exist a cluster of "1s" (or "0s" depending on how the thresholding operation was performed) are identified as potential candidates for the existence of defects. Mahdavieh at col. 5, l. 56 – col. 6, l. 41.

In order to determine whether or not a defect is actually present, the cluster regions are mapped and the corresponding mappings are identified in one of the original gray scale "result" images. Within each of these mappings, symmetrical coefficients for each suspected defect are determined. The symmetrical coefficients are measures of both vertical and horizontal gray scale intensity symmetry within a suspected defect region. The symmetrical coefficients, together with integral coefficients for total gray scale intensity within the suspected defect regions are then combined according to a certain algebraic expression to obtain a so-called "defect signal". If the defect signal for a suspected defect region meets or exceeds a certain threshold, a defect is declared to exist at the corresponding location on the device under test. Otherwise, no defect is declared to exist. Mahdavieh at col. 7, ll. 2-52.

Contrary to the statements contained in the Office Action, the mappings of the defect regions in the composite binary image and the corresponding mappings in the gray scale result image are not "theoretically-similar windows in an object image" as recited in claims 1 and 27 (the two independent claims in the present application). As defined in the present application, theoretically-similar windows are windows which are expected to exhibit the same symmetry properties as their respective database-image windows, assuming no defects are present therein. That is, the windows define regions of object features for which symmetry is expected. In contrast, the defect region mappings described by Mahdavieh are mappings created solely from object images, and not by comparisons or reference to database images and further are not created on the assumption that no defects are present therein. In fact, it is just the opposite that occurs in the process described by Mahdavieh; the defect region mappings are created solely because these are regions of suspected defects.

In addition, the process described by Mahdavieh does not permit the identification of defects according to deviations from expected symmetry as recited in the present claims. Instead, in Mahdavieh's procedure defects are identified on the basis of a thresholding operation

in which a defect signal is compared to a previously established criterion for determining the presence or absence of a defect. The symmetry coefficient computer by Mahdavieh does not yield the presence or absence of a defect based on a deviation from an expected result. Rather the symmetry coefficient is one parameter used in a larger computation to derive the deviation signal. Stated differently, in Mahdavieh's process at no time is the existence or non-existence of symmetry within a suspected defect region from an expected symmetry within that region ever used as the criteria for determining the presence or absence of a defect.

For at least these reasons, the present claims are patentable over Mahdavieh.

3. **The Present Claims are also Patentable Over Mahdavieh when Considered in Combination with Levy and/or Ong Because Neither of these References Cures the Underlying Defects Associated with Mahdavieh**

To establish a **prima facie** case of **obviousness**, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Here, regardless of whether or not there exists any motivation to combine the references cited in the Office Action, and whether or not such a combination would have a reasonable expectation of success, the present claims remain patentable over the various combinations of the references because even when considered collectively the references fail to teach or suggest all the claimed features of the present invention. More specifically, Levy et al., U.S. Patent 4,579,455, fail to teach or suggest the use of theoretically similar windows and the identification of defects according to deviations from expected symmetry as recited in the present claims. Thus, this reference suffers from the same defects as Mahdavieh.

Levy describes the die-to-die photomask inspection process referred to in the Background section of the present specification. As noted therein, this process determines the presence or absence of defects on the basis of a comparison between images of two different die patterns. Thus, there is no use of theoretically-similar windows as used in the context of the present claims, because no reference is made to a database image. Moreover, because there is no use of a theoretically-similar window, there is no analysis of expected deviations from the expected symmetry thereof. Accordingly, Levy fails to cure the deficiencies of Mahdavieh and the claims are therefore patentable over the combination of these references.

Ong et al., "Acoustic microscopy reveals IC package hidden defects" is an article that discusses non-destructive testing options for integrated circuit packages. In these processes, the presence or absence of defects are determined on the basis of the transmitted and reflected energy of an acoustic signal applied to a packaged semiconductor IC. Defects such as cracks lead to visually discernable discontinuities in images produced by the scanning acoustic microscope.

It should be apparent that no use of theoretically-similar windows or expected symmetries within such windows is present in the techniques described by Ong. Stated differently, adding the teachings of Ong to those of Mahdavieh and/or levy would not cure the deficiencies noted above. Consequently, the claims are patentable over the combinations of these references.

If there are any additional fees associated with this communication, please charge Deposit Account No. 02-2666.

Respectfully submitted,
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